

WHAT IS CLAIMED IS:

CLAIMS

1. A system for selectively blocking electromagnetic energy comprising:  
first means for employing a perforated component to pass a beam characterized by a first property and reject a beam characterized by a second property and  
5 second means for selectively altering a beam passed by said first means so that upon reflection, said beam exhibits said second property.
2. The system of Claim 1 wherein said first property corresponds to a first polarization, and said second property corresponds to a second polarization.
3. The system of Claim 2 wherein said perforated component includes a beamsplitter having a first perforated metallic plate.
4. The system of Claim 3 wherein said second means includes a quarter-wave plate having a second perforated metallic plate.
5. The system of Claim 4 wherein said quarter-wave plate is implemented via two perforated metallic eighth-wave plates.
6. The system of Claim 4 wherein said beamsplitter and said quarter-wave plate have rectangular, square, elliptical, or circular perforations therethrough.
7. The system of Claim 6 wherein said beamsplitter is sufficiently angled so that energy reflecting from said beamsplitter is directed away from a source of said beam.

8. The system of Claim 7 wherein said beamsplitter is angled approximately 45 degrees relative to said beam.

9. The system of Claim 8 wherein said beam is a quasioptical beam.

10. The system of Claim 9 wherein said source of said beam is a gyrotron that produces a high-power beam of microwave or millimeter-wave energy.

11. The system of Claim 4 wherein perforations in said beamsplitter and said quarter-wave plate are spaced in accordance with the following equations for perforation patterns arranged in an isosceles triangle and in a rectangle, respectively:

5 
$$2 \frac{\lambda}{d_x} \geq 1 + \sin \theta, \quad \frac{\lambda}{d_y} \geq 1 + \sin \theta$$

and

$$\frac{\lambda}{d_x} > 1 + \sin \theta, \quad \frac{\lambda}{d_y} > 1 + \sin \theta,$$

10 where  $\lambda$  is the wavelength of said beam;  $\theta$  is the approximate angle of incidence of said beam on said quarter-wave plate or said beamsplitter;  $d_x$  represents horizontal distance between perforation centers; and  $d_y$  represents vertical distance between perforation centers.

12. A system for selectively redirecting electromagnetic energy comprising:

first means for changing polarization of said electromagnetic energy from a first polarization to a second polarization and

5 second means for employing said second polarization to block and/or reflect said electromagnetic energy characterized by said second polarization via one or more perforations.

13. The system of Claim 12 wherein said first means includes a perforated quarter-wave plate.

14. The system of Claim 13 wherein said perforated quarter-wave plate is a perforated metallic quarter-wave plate.

15. The system of Claim 14 wherein said second means includes a perforated metallic beamsplitter.

16. The system of Claim 15 wherein said electromagnetic energy includes a quasioptical beam.

17. The system of Claim 16 wherein said quasioptical beam is a high-power microwave beam.

18. A quasioptical millimeter-wave isolator comprising:

a perforated metallic quarter-wave plate sufficient to change polarization of a quasioptical beam to be blocked and/or redirected from a first polarization to a second polarization and

5 a perforated metallic beamsplitter sufficient to block and/or reflect said quasioptical beam characterized by said second polarization.

19. A millimeter-wave source comprising:

first means for generating a quasioptical beam of electromagnetic energy of a first polarization;

5 second means for transmitting said quasioptical beam through a perforated plate, said perforated plate passing energy of a first polarization and reflecting and/or absorbing energy of a second polarization; and

third means for imparting said second polarization to energy reflected back toward said source so that said second means reflects and/or absorbs said energy reflected back toward said source.

20. The system of Claim 19 wherein said third means includes a perforated metallic quarter-wave plate.

21. The system of Claim 20 wherein said second means includes a source output window and a perforated metallic beamsplitter.

22. A method for selectively blocking electromagnetic energy comprising the steps of:

5      passing a beam of electromagnetic energy having a first polarization and rejecting electromagnetic energy having a second polarization via a perforated component and

selectively altering said first polarization so that a reflected beam of electromagnetic energy exhibits said second polarization before impinging on said first means.

23. The method of Claim 22 wherein said step of selectively altering includes employing a perforated component to selectively alter said first polarization.

24. A system for selectively blocking electromagnetic energy comprising:

a perforated metallic beamsplitter adapted to pass a beam characterized by a first property and to reject a beam characterized by a second property and

5      means for selectively altering a beam passed by said perforated metallic beamsplitter so that upon reflection, said beam exhibits said second property.

25. The system of Claim 24 wherein said metallic beamsplitter is a perforated metallic beamsplitter, and wherein said means for selectively altering a beam is a perforated metallic quarter-wave plate.

26. A system for selectively blocking electromagnetic energy comprising:

first means for employing a perforated component to pass a beam characterized by a first property and reject a beam characterized by a second property and

a metallic quarter-wave plate adapted to selectively alter a beam passed by said first means so that upon reflection, said beam exhibits said second property.

27. The system of Claim 24 wherein said metallic quarter-wave plate is perforated, and wherein said first means includes a perforated metallic beamsplitter.

28. A system for selectively blocking electromagnetic energy comprising:

a metallic beamsplitter adapted to pass a beam characterized by a first property and to reject a beam characterized by a second property and

5 a metallic quarter-wave plate adapted to selectively alter a beam passed by said metallic beam splitter so that upon reflection, said beam exhibits said second property.

29. The system of Claim 28 wherein said metallic beamsplitter and/or said metallic quarter-wave plate include perforations therein.